

## EAST Search History

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L1	3859	((424/776) or (424/725) or (426/629)).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2007/10/17 12:30
L2	404	I1 hypertension	US-PGPUB; USPAT; USOCR	AND	ON	2007/10/17 12:31
L3	63	I2 coffee	US-PGPUB; USPAT; USOCR	AND	ON	2007/10/17 12:40
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# Brix

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**Degrees Brix** (symbol °Bx) is a measurement of the mass ratio of dissolved sucrose to water in a liquid. It is measured with a saccharimeter that measures specific gravity of a liquid or more easily with a refractometer. A 25 °Bx solution is 25% (w/w), with 25 grams of sucrose sugar per 100 grams of liquid. Or, to put it another way, there are 25 grams of sucrose sugar and 75 grams of water in the 100 grams of solution.

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## Brix, Balling, Plato

The Balling scale was developed by German chemist Karl Balling. It refers to the concentration of a sucrose solution, as the weight percentage sucrose at 17.5°C.

The Brix scale was originally derived when Adolph Brix recalculated Balling's scale to a reference temperature of 15.5°C. The Brix scale was subsequently recalculated again, and now uses a reference temperature of 20°C. Brix can be approximated as  $261.3 \cdot (1 - 1/g)$ , where *g* is the specific gravity of the solution at 20°C.

The Plato scale which measures in Plato degrees is also a refinement of the Balling scale. It uses a reference temperature of 17.5°C and a slightly different modulus, with the approximation  $260 \cdot (1 - 1/g)$ , where *g* is the specific gravity of the solution at 17.5°C.

The three scales are often used interchangeably since the differences are minor.

- Brix is primarily used in fruit juice, wine making and the sugar industry.
- Plato is primarily used in brewing.
- Balling still appears on older saccharimeters, and is still used in the South African wine industry.

## Usage

Brix is used in the food industry for measuring the approximate amount of sugars in fruits, vegetables, juices, wine, soft drinks and in the sugar manufacturing industry. Different countries use the scales in different industries; in the UK brewing is measured with specific gravity X 1000, European brewers use Plato degrees, and US industries use a mix of specific gravity, Brix, degrees Baumé and Plato degrees.

For fruit juices, one degree Brix is about 1-2% sugar by weight. This usually correlates well with

perceived sweetness.

Since Brix is related to the concentration of dissolved solids (mostly sucrose) in a fluid it is therefore related to the specific gravity of the liquid. Because the specific gravity of sucrose solutions is well known, it can also be measured by refractometers.

Modern Brix meters are digital refractometers that calculate the Brix value based on refractive index. These meters are typically portable, splashproof and very simple to use, so that they can be operated by anybody directly on location. More and more often Brix is measured to determine ideal harvesting times of fruit and vegetables so that produce arrives at the consumers in a perfect state or is ideal for subsequent processing steps such as vinification.



## Scientific usage

When a refractometer is used, it is correct to report the result as "refractometric dried substance" (RDS). One might speak of a liquid as being 20 °Bx RDS. This is a measure of percent by weight of TOTAL dried solids and, although not technically the same as Brix degrees determined through a specific gravity method, renders an accurate measurement of sucrose content since the majority of dried solids are in fact sucrose. When an infrared Brix sensor is used, it measures the vibrational frequency of the sugar molecules, giving a Brix degrees measurement. This will not be the same measurement as Brix degrees using a density measurement because it will specifically measure dissolved sugar concentration instead of all dissolved solids.

## References

- Boulton, Roger; Vernon Singleton, Linda Bisson, Ralph Kunkee (1996). *Principles and Practices of Winemaking*. Chapman & Hall. ISBN 0-412-06411-1
- Rene Martinez VitalSensors Technologies LLC. VS1000B Series In-Line Brix Sensors for the Beverage Industry (<http://www.vitalsensorstech.com/VS-1000B%20Brix%20Sensor%20Data%20Sheet.pdf>).— Martinez describes the theory and practice of measuring brix on-line in beverages.

## See also

- Baumé scale

- Öchsle scale
- polarimetry

## External links

Specific Gravity Resources:

- Brix to Specific Gravity Table (<http://www.fermsoft.com/gravbrix.php>)
- Brix, Plato, Balling, Specific gravity (<http://byo.com/mrwizard/730.html>)
- brix in orange juice measurement ([http://www.abecitrus.com.br/english/faqs\\_us\\_resposta.asp?cod=96](http://www.abecitrus.com.br/english/faqs_us_resposta.asp?cod=96))

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